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agree with the Annelids in structure and innervation of the muscles and in dorso-ventral mesenteries bounded by epithelia. They differ from Annelids in entire absence of true metamerism, in the absence of a prestomial ganglion, in absence of seton and appendages and in structure of genitalia. The group cannot be regarded as degenerate Annelids (Vejdovsky) or as modified Nematods, but must be considered as an isolated group (Funacher, von Siebold, Villot) until more details concerning the development are known. The pertinence of the peculiar genus *Nectoruma* to the group is at least questionable.

**North Atlantic Invertebrata.**—Several papers in the 1st Hefts of the *Bergens Museums Aarbog* for 1903 have an interest to students of the Invertebrata of our northeastern coast. Emily Amesen catalogues the Sponges of the Norwegian coast, the present paper containing the Halichondrina. R. C. Punnett enumerates the Nemertini of Norway in which thirty-four species are recognized, of which twelve are supposed to be new. Edward T. Browne reports upon a collection of nineteen species of Medusæ, mostly from the fiords around Bergen, four of them being new and eleven others not previously catalogued from Norway. Among the interesting points brought out is the fact that the peculiar sucking cups described by Hæckel in *Ptychogastria polaris* (*Pectyllis arctica* Hæckel) are only the stumps of broken off tentacles. Only four species of Leptomedusæ are enumerated in the collection. All three papers are well illustrated.

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## BOTANY.

**The Desert Botanical Laboratory.**<sup>1</sup>—Of the occurrences of recent date interesting to the botanists of this and other countries, one of great importance is the establishment, by the Carnegie Institution, of a laboratory at which desert plants can be studied in their native habitat. Messrs. Coville and MacDougal were asked to constitute themselves a committee of inquiry, to determine the most suitable place where such a laboratory might be located. We have before us

<sup>1</sup> Coville, F. V. and MacDougal, D. T. Desert Botanical Laboratory of the Carnegie Institution. pp. 1-58, Pl. I-XXIX, fig. in text 1-4. Publication No. 6, Carnegie Institution of Washington, Nov. 1903.

the report of their journey, undertaken early last year, which took them over most of the desert regions of the western part of this continent. The place decided on for the laboratory was a site about two miles from Tucson, Arizona, and since then the laboratory has been built and equipped. Besides the fact that the country around Tucson is of a distinctly desert type and the flora as varied as such a flora is apt to be, the practical questions of accessibility and of habitability were considered. With the two authors as advisory board, Dr. W. A. Cannon was appointed resident investigator and is at present engaged on various researches. Arrangements have also been made so that a limited number of trained investigators may avail themselves of the privileges of the laboratory. "Not the least important part of the duties of the resident investigator will be to aid visiting botanists and others."

This contribution besides containing a description of the trip undertaken for the purpose of selecting a site for the laboratory, also includes an account of the general botanical and climatic features of the deserts of the regions visited. While the two authors had both separately made trips to many of the same districts of the west, the itinerary of their present journey included almost all of the arid regions of the United States and of northern Mexico. Starting at El Paso they first made their way down to the sand dunes of Chihuahua, south of Samalayuca in Mexico. The winter vegetation of these siliceous sand hills is scanty, only a few forms are mentioned. The next point of attack was the Tularosa desert lying westward of Alamogordo, New Mexico, the most interesting feature of which is the region known as the White Sands, composed of drifting sand that is almost wholly gypsum. The characteristic plant of the dunes is *Rhus trilobata*, the roots of which bind the sand so effectually that clumps of the plant bring about the formation of pillars of sand when the surrounding dunes shift. A curious relation of plants of *Yucca radiosa* to the dunes was also noticed. Investigation showed that a *Yucca* growing out of the top of a thirty-foot dune, must penetrate with its trunk to the bottom. On excavating it appeared that the plant must have grown as the dune engulfed it. In the bottoms among the dunes the vegetation is much denser, a grass is plentiful and *Ephedra* is frequently met with.

Tucson was next visited, there the woody vegetation of the desert consists mainly of the creosote bush, the mesquite, joint pine, and several Cactus forms, while higher on the foot hills occur the giant *Cereus*, and species of the tree known as the palo verde. At the

time of the rains a variety of annual vegetation may spring up. From Tucson the authors proceeded to the Sonora region of Mexico, stopping at Nogales, and thence to Torres. Various interesting forms are described from this region, among the most remarkable of which is a cucurbitaceous tendril bearing plant, *Ibervillea sonorae*, whose root and stem base are enormously swollen for water storage, and a tree-like morning-glory (*Ipomoea arborescens*), which grows twenty to thirty feet high. At Guaymas on the Gulf of California, a curious mixture of plant forms was observed, the beach is lined with mangroves, while close to them were the strictly xerophytic Cacti, for as far as rainfall is concerned Guaymas is even more arid than Torres.

In the Colorado desert of California several types of vegetation are found, due to differences in the soils; there are the gravel hills, the alkali, and salt flats, the two last named showing a very restricted growth of vegetation. The fan-leaved palm, *Neowashingtonia filifera* is native to the eastern foot hills of the San Bernardino mountains which lie in the Colorado desert district. They grow in groves forming miniature oases where a clayey soil, from which oozes what water has come from the hills, crops out to the surface. Northward lies the Mohave desert where grows *Yucca arborescens* and *Juniperus californica*, while in the lower altitudes the creosote bush (*Covillea tridentata*), is the prevailing woody plant. From the Mohave the authors proceeded to the grand canyon of the Colorado, but were disappointed to find that the number of woody desert plants found along the canyon's sides were comparatively small. This they ascribe to the narrowness of the canyon which probably induces abnormal climatic conditions.

Following the account of the actual journey is a consideration of the characteristics of deserts in general and of North American deserts in particular. Meteorological tables are given, showing the rain-fall for various localities from Oregon, to San Luis Potosi in Mexico. One table of especial interest gives the mean annual precipitation as compared with the estimated annual evaporation. The ratio in favor of the evaporation is anywhere from 6 : 1 to 35.2 : 1. It is also pointed out that the distribution of rain-fall during the year is of great importance in determining the character of the flora. Another factor in the production of desert conditions which cannot be disregarded is the soil constituents, a fact that is illustrated by the conditions which exist in the gypsum containing White Sands of Tularosa, the "white alkali" which is mainly sodium sulphate and the "black alkali" where sodium chloride and sodium bicarbonate are the chief soluble constituents.

Historically the desert regions of North America are of interest, that area which was known as "the great American Desert" by cartographers as late as 1843, does not really exist as such. The deserts of this continent may be designated as the Sierra-Nevada desert, comprising portions of Utah, Idaho, Washington, Oregon, Nevada, California, Arizona, Baja California, Sonora, and Sinaloa; and the Chihuahua desert, which occupies the tableland of Mexico east of the Sierra Madre and north into Texas, Arizona, and New Mexico. It is further stated that for the purposes of this paper the desert lands of the Dakotas, of Montana and Wyoming may be considered as the extreme northern arm of the last named region.

As the closing section of the paper there is a discussion of the results of experiments by one of the authors, carried on at an earlier date. A comparison of two desert types, *Mentzelia pumila*, and an *Artemisia*, with two moisture loving forms, tomato and *Eucalyptus globosus*, shows that even in their natural habitats, where the conditions for transpiration are of course vastly in favor of the desert plants, the disparity between the water evaporation of the two is very great. As to temperature it was found that the plant-body of an *Opuntia* gave a maximum in the forenoon of as much as  $111.2^{\circ}$  Fahr., while in specimens of *Cereus* temperatures of  $113^{\circ}$  to  $115^{\circ}$  Fahr., were frequently found. The fact that this is above the critical temperature usually given for chlorophyll leads to the authors' suggestion that the protoplasm and the chloroplasts may have undergone changes which adapt them for such conditions, although, they add, it is not unlikely that the death of plants in such regions is as often the result of too great insolation as of lack of water.

The authors make no claim that their narrative is an exhaustive account of the regions visited, which considering the short time spent would of course be quite impossible, but express a hope that it will serve to show the great diversity which exists in the several floras which go to make up our desert flora as a whole. In this they can certainly feel that they have succeeded both in the text and in the admirable illustrations which are profusely scattered through the pamphlet. To any intending student of the conditions which exist in our deserts it is bound to be of great service and the full bibliography by W. A. Cannon which is appended will be an additional aid. This is the first publication relative to the desert laboratory, we may hope that many more will emanate from this source.

H. M. R.